



ACT Government Analytical Laboratory
Forensic Chemistry and Toxicology Unit
Road Transport (Alcohol and Drugs) Act 1977
Report on analytical findings
February 2015

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Background

The *Road Transport (Alcohol and Drugs) Act 1977* (the Act, current version June 2014) specifies offences relating to driving while having ingested drugs and/or alcohol. The ACT Government Analytical Laboratory (ACTGAL) of the Health Protection Service provides an analytical toxicology service to analyse biological specimens and report certified results on the presence of drugs and alcohol in such samples. ACTGAL is an “Approved Laboratory” and employs appointed “Analysts” as described in the Act.

Note that for the purpose of the Act, a “prescribed drug” includes tetrahydrocannabinol (THC), methylamphetamine and MDMA.

Offences included in the Act relating to alcohol and drugs while driving are shown in **Box 1**.

Box 1 – Excerpt from *ACT Road Transport (A&D) Act 1977*

Part 3 Offences

19 Prescribed concentration of alcohol in blood or breath

- (1) A person commits an offence if the person—
 - (a) has been—
 - (i) the driver of a motor vehicle on a road or road related area; or
 - (ii) the driver trainer in a motor vehicle on a road or road related area;and
 - (b) has, within the relevant period, the prescribed concentration of alcohol in the person’s blood or breath.

20 Prescribed drug in oral fluid or blood—driver or driver trainer

- (1) A person commits an offence if the person—
 - (a) has been—
 - (i) the driver of a motor vehicle on a road or road related area; or
 - (ii) the driver trainer in a motor vehicle on a road or road related area;and
 - (b) has, within the relevant period, a prescribed drug in the person’s oral fluid or blood.

Box 1 (Cont.) – Excerpt from ACT *Road Transport (A&D) Act 1977*

24 Driving under the influence of intoxicating liquor or a drug

- (1) A person who drives a motor vehicle on a road or road related area while under the influence of intoxicating liquor or of a drug to such an extent as to be incapable of having proper control of the motor vehicle commits an offence.

24A Driver etc intoxicated

- (1) A person must not drive or ride a vehicle or animal on a road, or be in charge of a vehicle or animal on a road, while under the influence of alcohol.
Maximum penalty: 50 penalty units, imprisonment for 6 months or both.
- (2) In this section:
animal means a horse, cattle or sheep.
vehicle means—
 - (a) a bicycle; or
 - (b) an animal-drawn vehicle.

Analytical testing for the confirmation of the presence and level of alcohol and drugs is necessary as defined by the provisions of the Act shown in **Box 2**.

Box 2 – Excerpt from ACT *Road Transport (A&D) Act 1977*

Division 2.5 Prescribed drugs—confirmatory tests

13G Oral fluid—confirmatory analysis

- (3) An analyst at the approved laboratory to which the sample is taken under subsection (2) must, as soon as practicable, arrange for the analysis of the sample at the laboratory or another approved laboratory to work out whether a prescribed drug is present in the sample.

Division 2.7 Analysis of blood—alcohol and drugs

15A Analysis of blood samples

- (2) The analyst must, as soon as practicable, arrange for the analysis of the sample of blood at an approved laboratory to work out, in accordance with a request made by a police officer—
 - (a) the concentration of alcohol in the blood; or
 - (b) whether a prescribed drug is present in the blood.

Box 2 (Cont.) – Excerpt from ACT *Road Transport (A&D) Act 1977*

- (3) If a police officer has reasonable cause to suspect that the tested person has a drug other than a prescribed drug or alcohol in the person's body, or that the tested person's behaviour may be affected by the presence of a drug other than a prescribed drug or alcohol in the person's body, the police officer may ask the analyst to work out the following:
- (a) whether 1 or more drugs other than a prescribed drug or alcohol are present in the sample;
 - (b) if a drug other than a prescribed drug or alcohol is present in the sample—the concentration, quantity or other measurement of the drug.

16A Analysis of body samples

- (2) The analyst must, as soon as practicable, arrange for the analysis of the sample at an approved laboratory to work out, as far as practicable—
- (a) whether any drug, including a prescribed drug or alcohol was present in the tested person's body when the sample was taken; and
 - (b) if the sample is of the tested person's blood—the concentration, quantity or other measurement of a drug, including a prescribed drug or alcohol, in the sample.

In summary, the laboratory provides an analytical toxicology service to support the following circumstances:

- The mandatory requirement for a hospitalised driver of a motor vehicle collision to undergo testing to ascertain the level of blood alcohol in the driver's blood sample.
- The mandatory requirement for a hospitalised driver of a motor vehicle collision to undergo testing to ascertain the presence/absence of a prescribed drug or drugs in the driver's blood sample.
- The testing of blood and/or other body (urine) samples for the presence and/or level of a prescribed drug or any other drug, to support a police investigation into driving under the influence of an intoxicating substance.
- Random roadside oral fluid testing for the confirmation of the presence of a prescribed drug or drugs.

Blood alcohol analytical results

Blood alcohol testing of drivers following motor vehicle collisions has occurred in the ACT for many decades. In 1998, it became mandatory for a hospitalised driver of a motor vehicle collision to have a blood sample taken and analysed for the level of alcohol.

Table 1 contains the data from tests performed on blood samples that have been retrieved from the Police one-way boxes from the years 2002 to 2014. The majority of sampling is performed at the emergency departments of the two major hospitals and hence the majority of samples come from patients involved in motor vehicle collisions.

It's a requirement of the Act that if a Doctor or Nurse suspects a patient was a driver, then a mandatory sample must be collected. This is not fool-proof however as sometimes it's difficult to ascertain who the driver was, and so multiple samples, including those of passengers and pedestrians, may also be collected.

Additionally, a small number of samples are collected from drivers who have not had accidents, but are suspected by police of driving under the influence of an intoxicating substance.

Table 1 – Blood Alcohol Analyses Performed at ACTGAL 2002-2014

Year	Positive	Negative	Total	% Positive
2002	141	823	964	14.63
2003	123	881	1004	12.25
2004	133	801	934	14.24
2005	142	956	1098	12.93
2006	146	830	976	14.96
2007	133	840	973	13.67
2008	140	898	1038	13.49
2009	134	966	1100	12.18
2010	130	1012	1142	11.38
2011	128	1241	1369	9.35
2012	123	1258	1381	8.91
2013	141	1422	1563	9.02
2014	118	1500	1618	7.29
Totals	1732	13428	15160	11.42

The data from Table 1 is graphed in **Figure 1**.

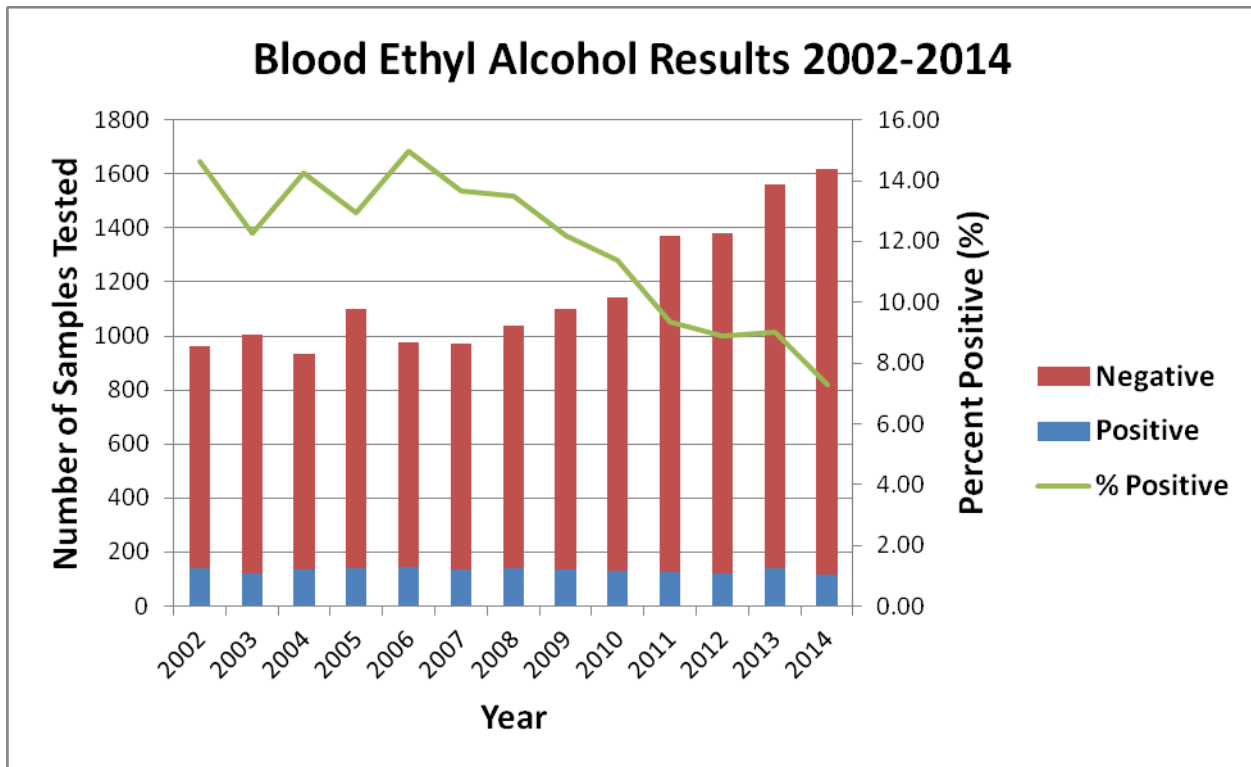


Figure 1 – Blood Alcohol Analyses Performed at ACTGAL 2002-2014

One thing of note is the significant increase in the number of samples but the relative stability of the number of positive results. As indicated above, this has to be considered in the context of potentially changing sampling regimes and may be independent of each other.

Range of positive alcohol results

Table 2 contains the blood alcohol concentrations of all the positive results from 2002-2014 in 0.05 g/mL groupings. **Figure 2** is a graph of this data.

Table 2 – Alcohol Positive Results by Concentration Range 2002-2014

Conc. EtOH (g/100 mL)	Number	Percent (%)
0-0.049	289	16.7
0.050-0.099	336	19.4
0.100-0.149	380	21.9
0.150-0.199	345	19.9
0.200-0.249	240	13.9
0.250-0.299	95	5.5
0.300-0.349	32	1.8
0.350-0.399	10	0.6
0.400-0.449	4	0.2
0.450 +	1	0.1
Totals	1732	100.0

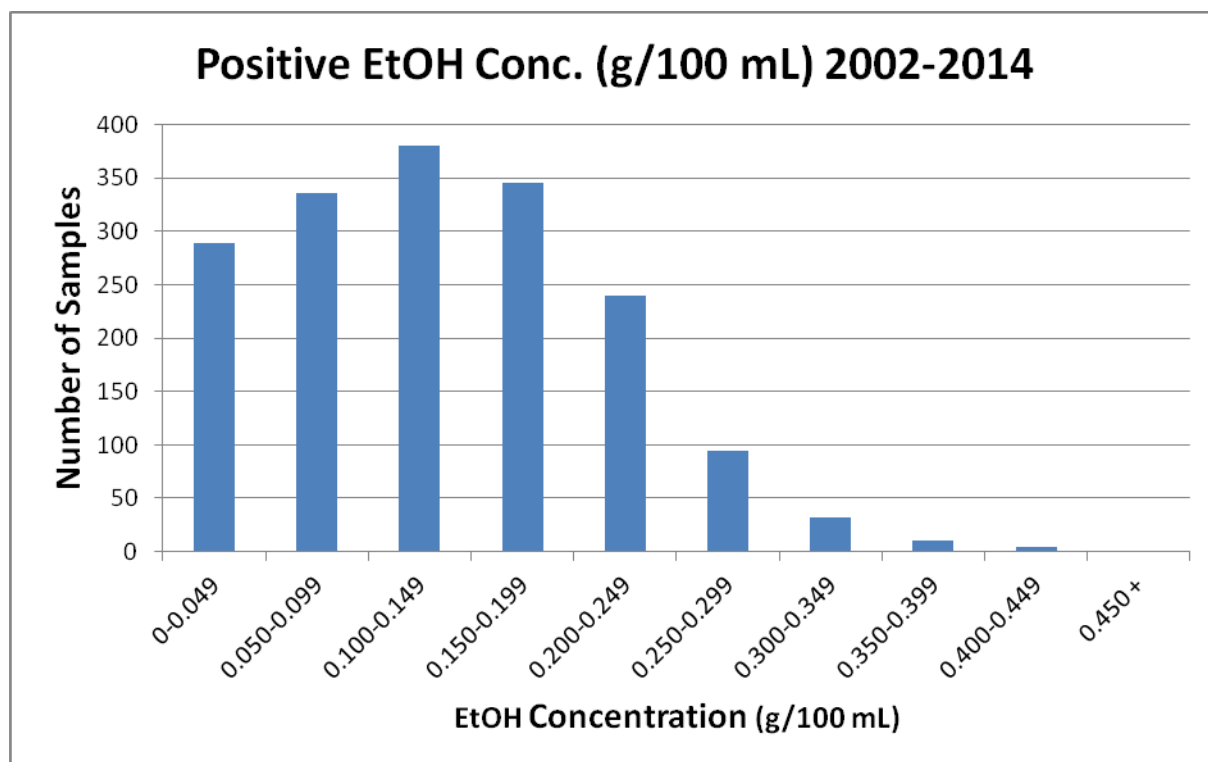


Figure 2 – Blood Alcohol Positive Results by Concentration Range 2002-2014

The range with the highest number of positive blood alcohol results for the 13 years of data from 2002 to 2014 is 0.100-0.149 g/100 mL. The mean and median for this data are 0.136 g/100 mL and 0.134 g/100 mL respectively. The highest level recorded was 0.469 g/100 mL in 2005.

Table 3 contains the blood alcohol concentrations of all the positive results for the single year; 2014 in 0.05 g/mL groupings. **Figure 3** is a graph of this data.

Table 3 – Alcohol Positive Results by Concentration Range 2014

Conc. EtOH (g/100 mL)	Number	Percent (%)
0-0.049	19	16.1
0.050-0.099	21	17.8
0.100-0.149	32	27.1
0.150-0.199	23	19.5
0.200-0.249	13	11.0
0.250-0.299	7	5.9
0.300-0.349	1	0.8
0.350-0.399	2	1.7
0.400-0.449	0	0.0
0.450 +	0	0.0
Totals	118	100.0

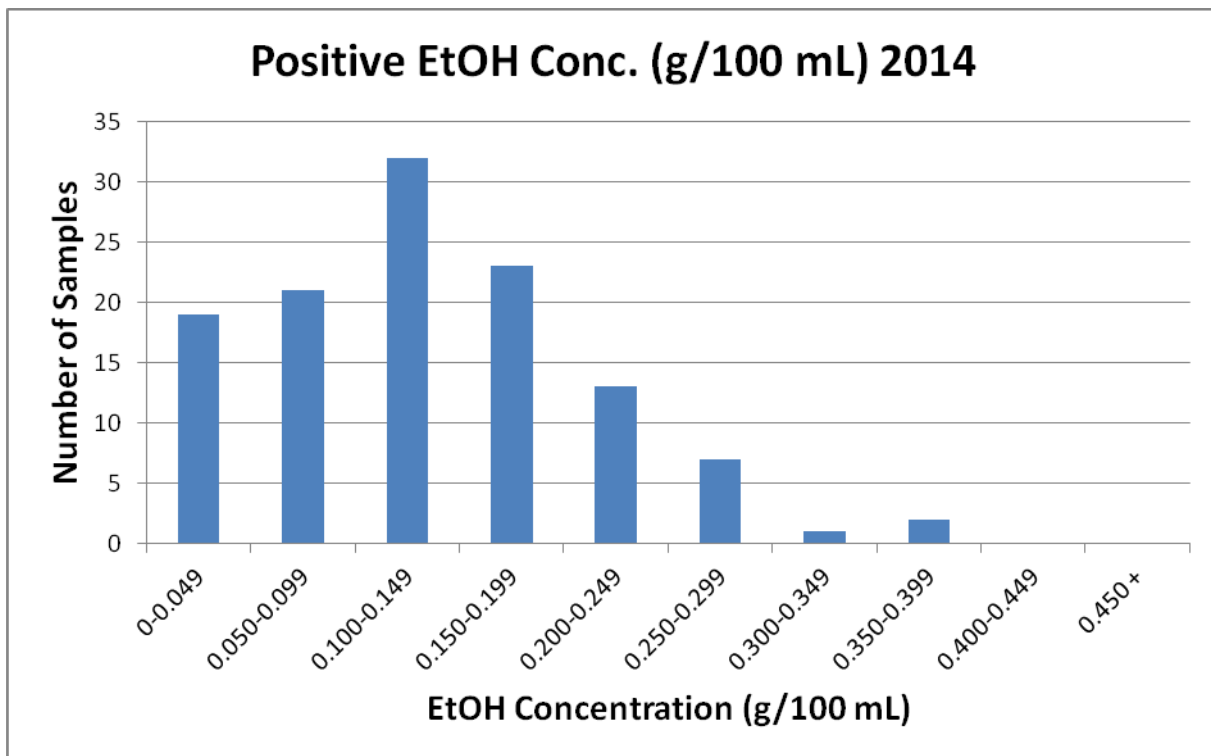


Figure 3 – Blood Alcohol Positive Results by Concentration Range for 2014

The range with the highest number of positive blood alcohol results for data from the year of 2014 is also 0.100-0.149 g/100 mL. The mean and median for this data are 0.135 g/100 mL and 0.130 g/100 mL respectively. The highest concentration result in 2014 was 0.398 g/100 mL.

How the concentrations of alcohol relate to “levels”

In the Act, a “level” of alcohol is defined, and is important as it relates to considering the seriousness of an offence and the potential penalty imposed (**Box 3**).

Box 3 – Excerpt from *ACT Road Transport (A&D) Act 1977*

Part 1A Important concepts

4C Meaning of *prescribed concentration* of alcohol

For this Act, the *prescribed concentration* of alcohol in a person’s blood or breath is—

- (a) for a special driver—more than 0g of alcohol in 100mL of blood or 210L of breath;
or
- (b) for any other person—0.05g or more of alcohol in 100mL of blood or 210L of breath.

4E Reference to *level* of alcohol concentration

For this Act, a reference to a concentration of alcohol at a *level* mentioned in an item in table 4E, column 2, is a reference to the concentration of alcohol mentioned in the item, column 3, in 100mL of blood or 210L of breath.

Table 4E

column 1 item	column 2 level	column 3 alcohol concentration range
1	level 1	less than 0.05g
2	level 2	0.05g or more but less than 0.08g
3	level 3	0.08g or more but less than 0.15g
4	level 4	0.15g or more

Table 4 contains the data for positive blood alcohol samples for 2002-2014 and the levels they pertain to as indicated in the Act.

Table 4 – Alcohol Positive Results by “Level” 2002-2014

	Conc. EtOH (g/100 mL)	Number Positive	Percent (%)
Level 1	0 - <0.050	289	16.7
Level 2	0.050 - <0.080	198	11.4
Level 3	0.080 - <0.150	518	29.9
Level 4	0.150+	727	42.0
Totals		1732	100.0

Figure 4 is a graph of the data in Table 4.

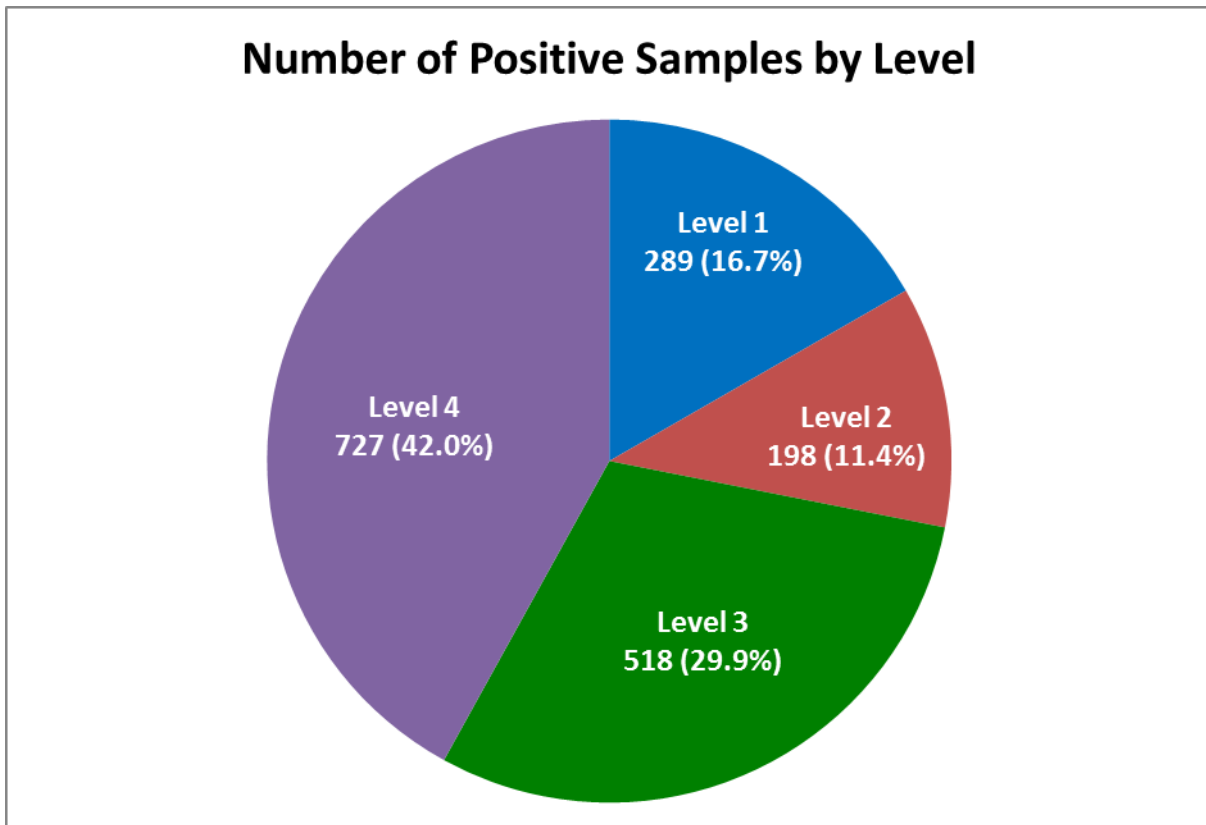


Figure 4 – Blood Alcohol Positive Results by “Level” for 2002-2014

Of the samples, 42% were above 0.150 g/100 mL and nearly 72% (Level 3 and Level 4 combined) were above 0.080 g/100 mL.

Blood drugs analytical results

Prescribed drugs in blood

As indicated above, for the purpose of the *ACT Road Transport (Alcohol & Drugs) Act 1977*, a prescribed drug is one of three drugs; tetrahydrocannabinol (THC), methylamphetamine, and MDMA. The requirement in the Act for the investigation of prescribed drugs in the blood of drivers came into effect in December 2010 and ACTGAL has been providing the analytical capability and certified evidence of the presence of prescribed drugs in blood for samples since March 2012.

The majority of blood samples that are analysed at ACTGAL for prescribed drugs come from drivers involved in motor vehicle collisions that result in hospitalisation. Essentially these are the same blood samples that were discussed in the alcohol sections above. Some samples are positive for both alcohol and a prescribed drug or drugs. This data will also be presented below.

As noted above, it is sometimes difficult for emergency staff to ascertain who the driver was and so small numbers of samples from passengers and pedestrians may also be collected.

Additionally, a small number of samples are collected from drivers who have not had accidents, but are suspected by police of driving under the influence of an intoxicating substance.

In the period 22 March 2012 – 19 January 2015 (almost three years), ACTGAL has analysed 4356 blood samples for the three prescribed drugs. The numbers of drugs reported and a breakdown of the drugs found are shown in **Table 5**.

Table 5 – Prescribed drugs detected March 2012 – January 2015

	Number	Percent (%)
Negative	3899	89.51
THC	278	6.38
Methylamphetamine	110	2.53
MDMA	14	0.32
THC + Methylamphetamine	48	1.10
THC + MDMA	3	0.07
Methylamphetamine + MDMA	3	0.07
All Three Prescribed Drugs	1	0.02
Total	4356	100

Almost 90% of the samples were negative for any of the prescribed drugs meaning that over 10% had one or more of the prescribed drugs present. 9.2% (402) were positive for one drug and 1.3% (55) were positive for two or more drugs.

Prescribed drugs and alcohol in blood

In the period 22 March 2012 – 19 January 2015, 3637 (83.5 %) of samples were negative for alcohol or a prescribed drug, meaning that 719 (16.5 %; 1 in 6) were positive for alcohol, a prescribed drug or a combination of alcohol and/or prescribed drugs. This data is presented in **Table 6** and **Figure 5**.

Table 6 – Alcohol and Prescribed Drugs Detected March 2012 – January 2015

	Number	Percent (%)
Negative	3637	83.49
EtOH Only	262	6.01
THC Only	211	4.84
Methylamphetamine Only	94	2.16
MDMA Only	6	0.14
THC + Methylamphetamine	38	0.87
THC + MDMA	1	0.02
Methylamphetamine + MDMA	3	0.07
EtOH + THC	67	1.54
EtOH + Methylamphetamine	16	0.37
EtOH + MDMA	8	0.18
EtOH + THC + Methylamphetamine	10	0.23
EtOH + THC + MDMA	2	0.05
EtOH + Methylamphetamine + MDMA	0	0.00
EtOH + All Three Prescribed Drugs	1	0.02
	4356	100

Alcohol and Drug Positive Samples March 2012 - January 2015

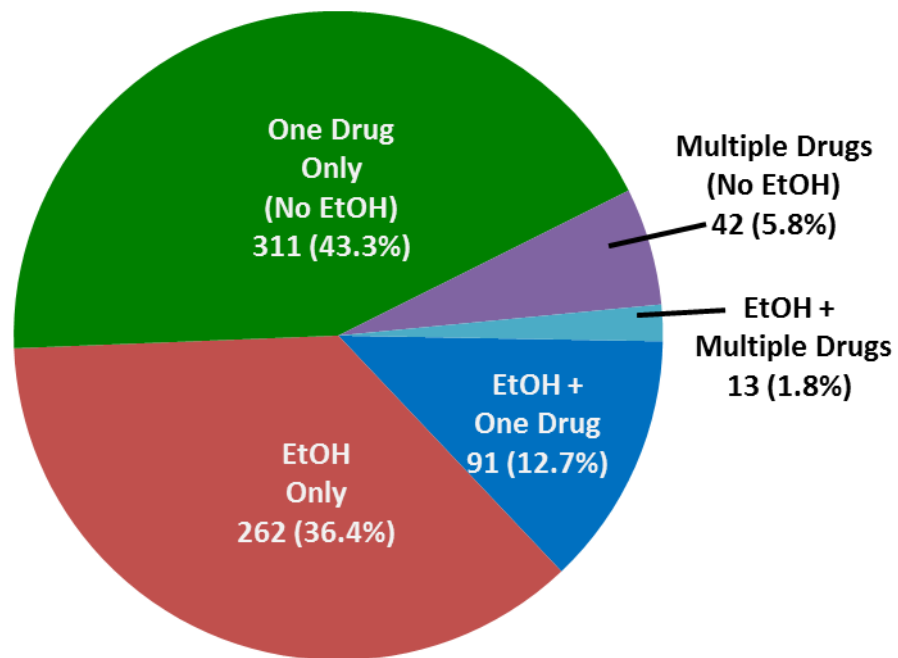


Figure 5 – Alcohol and Drug Positive Samples March 2012 - January 2015

Figure 5 shows that 79.7% of positive samples contained one prescribed drug or alcohol while 20.3% contained a combination of alcohol and prescribed drugs or multiple prescribed drugs. Just over half (50.9%) contained some alcohol with 104 (28.4% of the ones with alcohol present) containing one or more prescribed drugs.

Note that this data includes samples that were positive for alcohol with concentrations less than 0.05 g/100 mL. Of the 366 samples that contained alcohol, 51 (14 %) had a concentration of alcohol less than 0.05 g/100 mL and of these 51 samples, 33 did not contain a prescribed drug. In these cases, it is likely no criminal offense relating to alcohol or prescribed drugs was committed, however, it is difficult to know as some “Special Drivers” (as defined in the Act, e.g. provisional or taxi/bus drivers) have a legal limit of zero alcohol in blood content. If the 33 samples were to be considered as “negative”, the proportion of negative samples would increase from 83.5% (3637) to 84.3% (3670) and the proportion of samples testing positive for alcohol at 0.05 g/100 mL or higher and/or a prescribed drug would decrease from 16.5% (719) to 15.7% (686).

Prescribed alcohol and drug concentrations in blood

As mentioned above for alcohol, the Act defines “levels” and relevant penalties when there is alcohol present in the blood of drivers. However, the concentration of the prescribed drug is not relevant to the Act and a violation is committed based on presence only. Analytically, at ACTGAL, the approximate concentration of a detected prescribed drug is recorded for academic purposes.

Over the period 22 March 2012 – 19 January 2015, the range and median alcohol and prescribed drug concentrations are shown in **Table 7**.

Table 7 – Alcohol and Prescribed Drugs Concentrations March 2012 – January 2015

	EtOH (g/100 mL)	THC (ng/mL)	Meth. (mg/L)	MDMA (mg/L)
n	366	330	162	21
Min	0.010	2.0	0.004	0.005
Max	0.412	72.3	1.539	0.653
Median	0.127	5.7	0.084	0.065
Mean	0.135	7.9	0.179	0.137

The range, median and mean of the positive alcohol concentrations for this period is not dissimilar to that described above for 2002-2014.

The range of THC concentrations is graphed below in **Figure 6**.

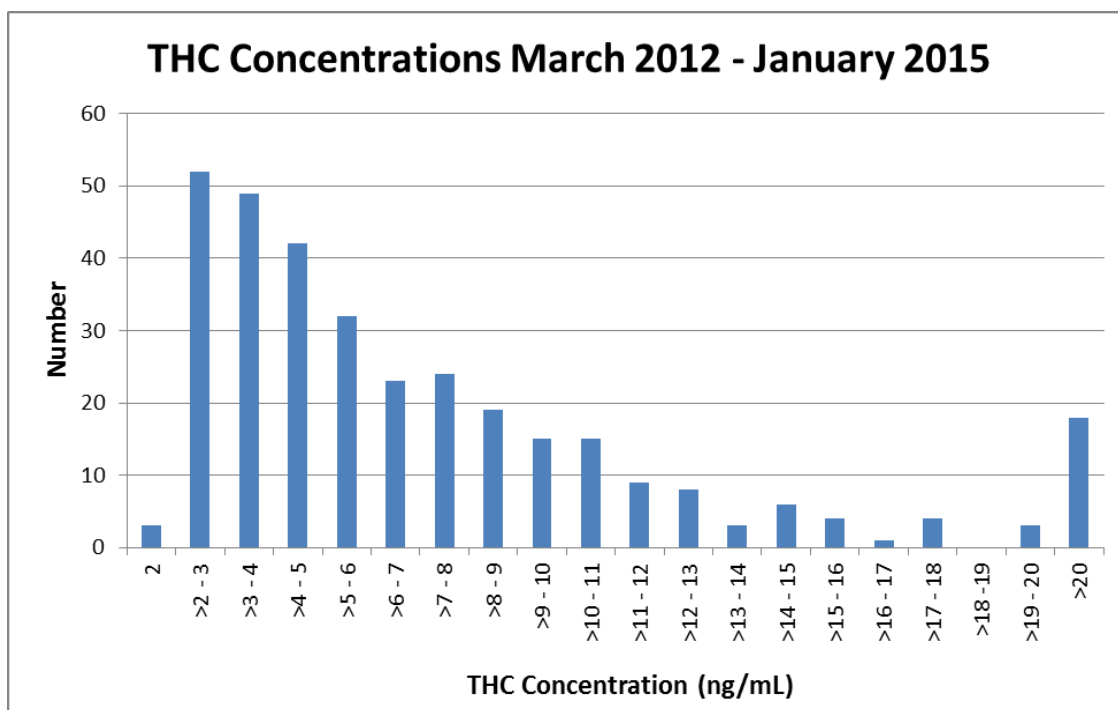


Figure 6 – THC Concentrations (ng/mL) March 2012 – January 2015

For THC, 2 ng/mL is the limit of detection of the analytical method. Of the 330 samples that were positive for THC, 48 also contained methylamphetamine, 3 contained MDMA and one contained all three prescribed drugs. 80 contained alcohol and/or one or more prescribed drug.

The range of methylamphetamine concentrations is graphed below in **Figure 7**.

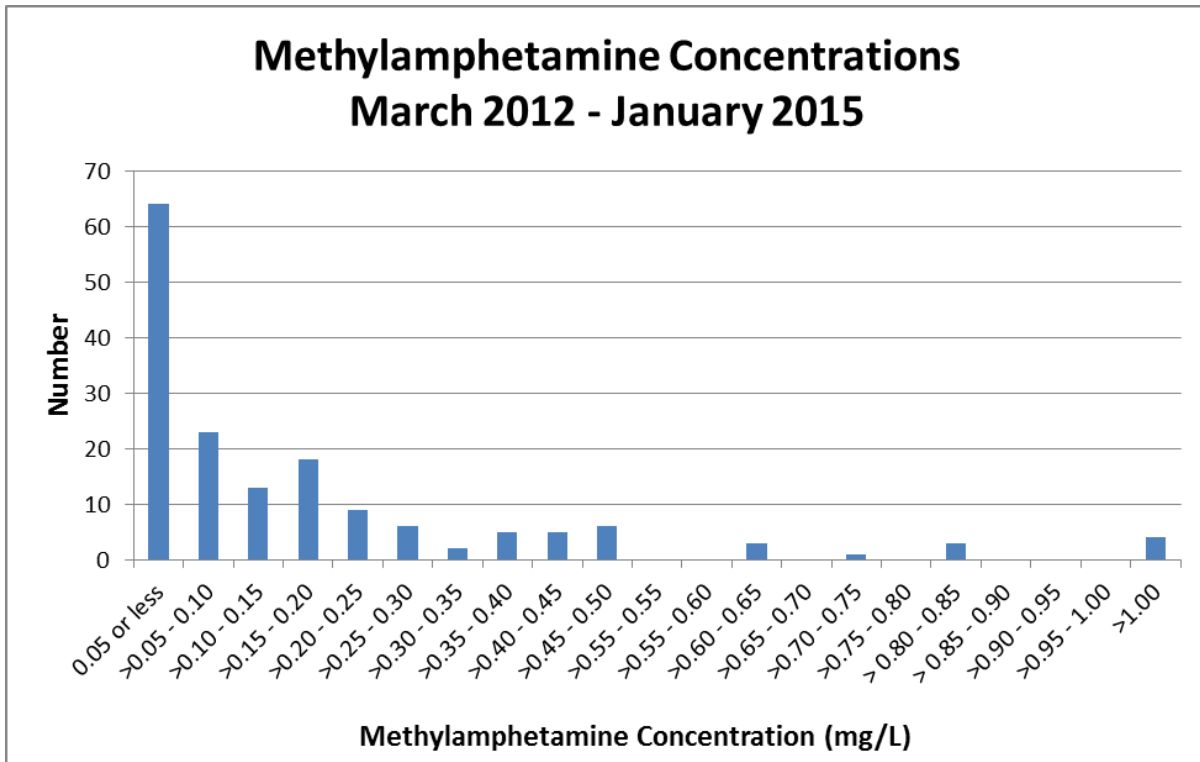


Figure 7 – Methylamphetamine Concentrations (mg/L) March 2012 – January 2015

For Methylamphetamine, 0.004 mg/L is the limit of detection of the analytical method. Of the 162 samples that were positive for methylamphetamine, 48 also contained THC, 3 contained MDMA and one contained all three prescribed drugs. 27 contained alcohol and/or one or more prescribed drug.

The range of MDMA concentrations is graphed below in **Figure 8**.

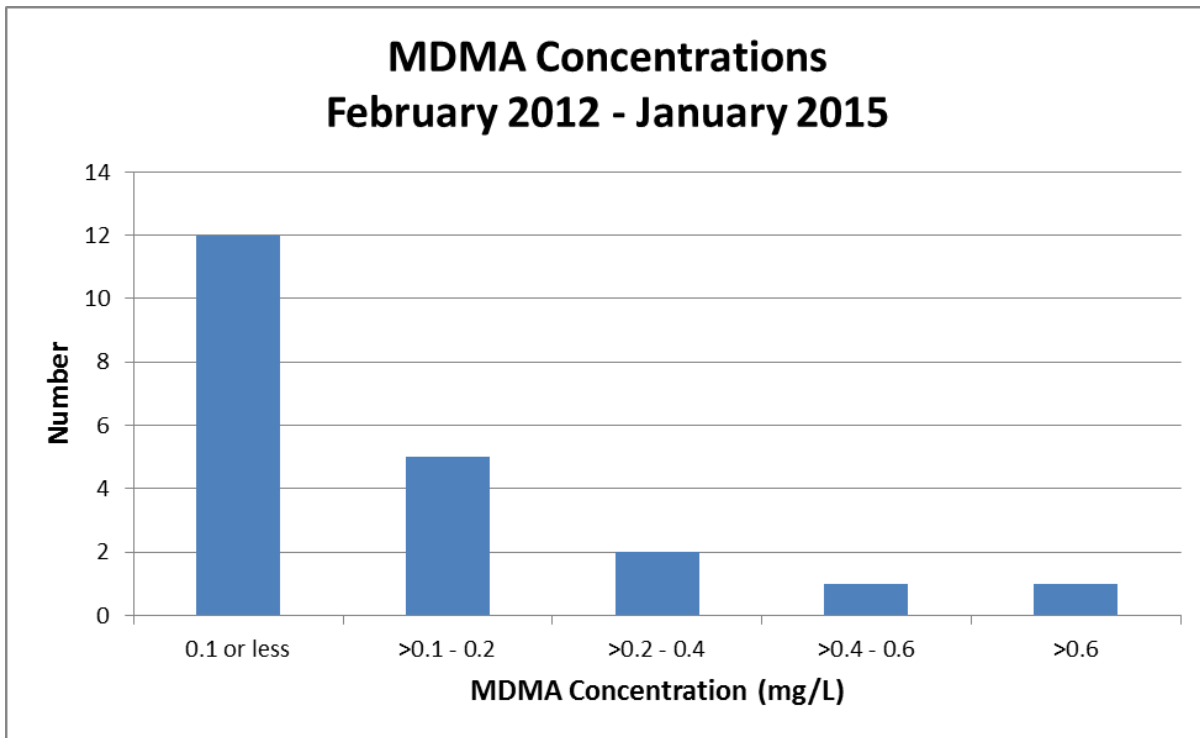


Figure 8 – MDMA Concentrations (mg/L) March 2012 – January 2015

For MDMA, 0.004 mg/L is the limit of detection of the analytical method. Of the 21 samples that were positive for MDMA, 3 also contained THC, 3 contained methylamphetamine and one contained all three prescribed drugs. 15 contained alcohol and/or one or more prescribed drug.

Prescribed drugs in 2013 and 2014

The type and proportion of prescribed drug for the two full years that testing has been conducted is tabulated in **Table 8**.

Table 8 – Comparison of Prescribed Drugs Detected in 2013 and 2014

	2013		2014	
	Number Positive	Percent (%)	Number Positive	Percent (%)
THC	125	8.00	119	7.61
Methylamphetamine	69	4.41	58	3.71
MDMA	4	0.26	12	0.77
Total Tested	1563	100	1618	100

Note that this table includes samples where multiple drug use and alcohol was detected. The comparison of this data is represented in **Figure 9**.

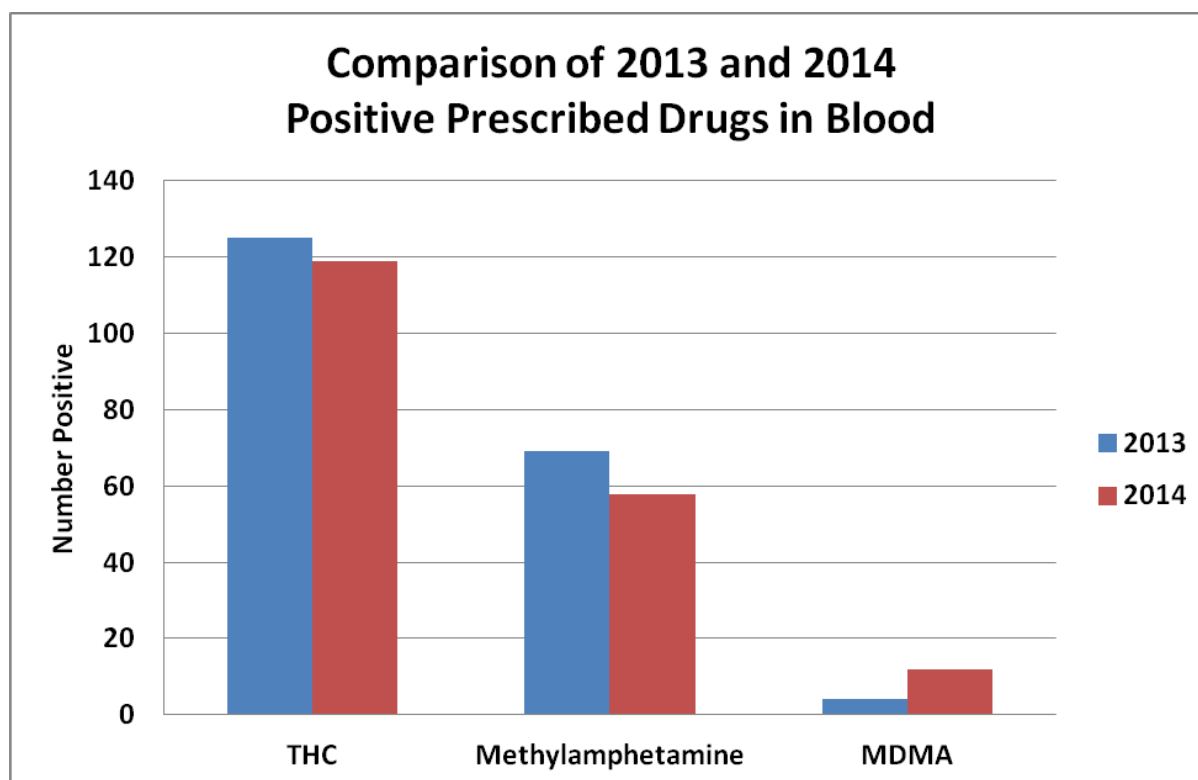


Figure 9 – Comparison of 2013 and 2014 Prescribed Drugs in Blood

Other Drugs

As indicated above, in section 15A(3) of the Act, “If a police officer has reasonable cause to suspect that the tested person has a drug other than a prescribed drug or alcohol in the person’s body, or that the tested person’s behaviour may be affected by the presence of a drug other than a prescribed drug or alcohol in the person’s body, the police officer may ask the analyst to work out whether 1 or more drugs other than a prescribed drug or alcohol are present in the sample” and “...the concentration, quantity or other measurement of the drug.”

For the period 22 March 2012 – 19 January 2015, 42 requests were made to perform tests to determine the level of a detected prescribed drug and/or whether other drugs may be present. Sometimes these requests are targeted at specific drugs or drug classes as the police may have intelligence. Other times broader screening is applied.

Other drugs that have been detected in drivers in these cases (and the number of times in parentheses) include alprazolam (4), clonazepam (3), Codeine (3), diazepam (22), duloxetine (2), ibuprofen (1), lorazepam (5), methadone (5), metoclopramide (3), morphine (21), nordiazepam (23), oxazepam (7), oxycodone (2), paracetamol (1), propranolol (1) and temazepam (2). Also included in this group of 42 samples was delta-9-tetrahydrocannabinol (THC, 12), methylamphetamine (10), both THC and methylamphetamine (3) and methylamphetamine and MDMA (1).

Oral fluid analytical results

In accordance with Section 20 of the Act stated above, the police conduct a random oral fluid testing programme using a presumptive immunoassay based screening technology. Since November 2011, the laboratory has provided the confirmatory testing of the three prescribed drugs; delta-9-tetrahydrocannabinol (THC), methylamphetamine and MDMA. The results of oral fluid confirmations performed at ACTGAL in this period are tabulated in **Table 9** and represented graphically in **Figure 10**.

Table 9 – Oral Fluid Analyses November 2011 – January 2015

	Number	Percent (%)
THC	204	33.9
Methylamphetamine	204	33.9
MDMA	7	1.2
THC + Methylamphetamine	160	26.6
THC + MDMA	9	1.5
Methylamphetamine + MDMA	5	0.8
All three Prescribed Drugs	3	0.5
No Prescribed Detected	10	1.7
Total	602	100

Oral Fluid Analytical Results November 2011 – January 2015

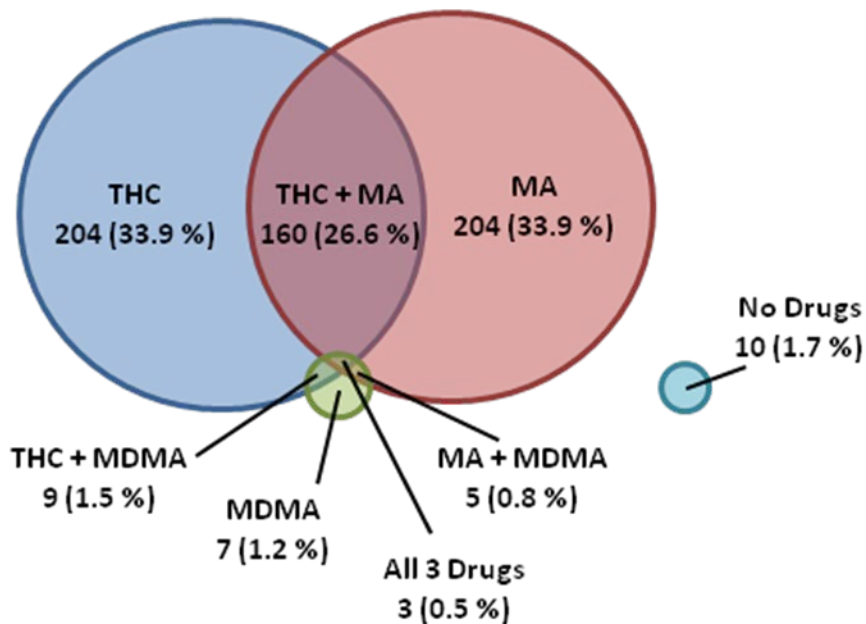


Figure 10 – Oral fluid analytical results November 2011 – January 2015

Comparison of prescribed drugs in oral fluid to prescribed drugs in blood

Over the similar period, the prescribed drugs in blood that were detected in the blood samples originating from hospitalisations are presented in **Table 10** (this is a re-presentation of the data of Table 5 with the negative for prescribed drug data removed). This data is graphically represented in Figure 11.

Table 10 – Prescribed drugs detected March 2012 – January 2015

	Number	Percent (%)
THC	278	60.8
Methylamphetamine	110	24.1
MDMA	14	3.1
THC + Methylamphetamine	48	10.5
THC + MDMA	3	0.7
Methylamphetamine + MDMA	3	0.7
All Three Prescribed Drugs	1	0.2
Total	457	100

Blood Prescribed Drugs March 2012 – January 2015

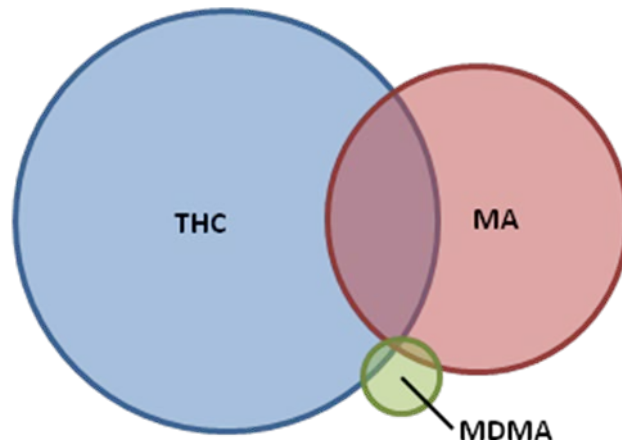


Figure 11 – Blood Prescribed Drugs March 2012 – January 2015

It is interesting to note that the ratio of THC to methylamphetamine is much higher in blood than in the oral fluid samples. This may be ascribed to the technological limitations of the screening devices.